


# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 24 MAY 2005  
PCT

Applicant's or agent's file reference JCALS-92-PCT		<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/JP2004/014019		International filing date (day/month/year) 17.09.2004		Priority date (day/month/year) 30.09.2003
International Patent Classification (IPC) or national classification and IPC F04B39/10, F04B27/08				
Applicant CALSONIC KANSEI CORPORATION et al.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand  27.04.2005		Date of completion of this report  23.05.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer  Gnüchtel, F  Telephone No. +49 89 2399-2012		



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**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/JP2004/014019

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-14 as originally filed

**Claims, Numbers**

1-10 as amended (together with any statement) under Art. 19 PCT

**Drawings, Sheets**

1/10-10/10 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☒ the claims, Nos. 1,5
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/JP2004/014019

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1,2,5-7,9,10
	No: Claims	
Inventive step (IS)	Yes: Claims	2,5-7,9
	No: Claims	1,10
Industrial applicability (IA)	Yes: Claims	1,2,5-7,9,10
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

**Re Item I**

**Basis of the report**

- I.1 The present examining authority considers that the amendments filed with the letter dated February 25, 2005 introduce subject-matter which extends beyond the content of the application as originally filed, contrary to Article 34(2)(b) PCT. The amendments concerned are the following:

In order to attempt to overcome a lack of inventive step in the sense of Article 33(3) PCT concerning the subject-matter of original claim 1 which has been objected in the Written Opinion of the Search Authority, the applicant has added the feature, wherein "there is no gap in the valve structure except for the opposing part".

It is not apparent where in the original application documents this feature is explicitly defined. As far as the drawing figures and their respective description passages are concerned there is persistently shown a clearance, i.e. a "gap" between the part of the valve plate which contains the groove 22 (and areas outside of said groove 22) and the suction valve main body. These clearances/gaps are not in an area where the "opposing part (26)" of the suction valve is facing the suction hole (20) and valve seat (23). There seems to be no basis in the original application documents that the "opposing part (26)" extends to areas beyond where it "faces the suction hole (20) and valve seat (23)". Therefore, the gaps in the areas of (and outside of) groove (22) -which are shown in all originally filed embodiments- are considered as gaps outside of the "opposing part".

Hence, the respective subject-matter of the amended claim 1 extends beyond the content of the application as originally filed, contrary to the requirements of Article 34(2)(b) PCT.

- I.2 With regard to the feature added to the subject-matter of claim 5, wherein "a groove formed thinner than the valve seat" is provided, the applicant has given no indication where its basis in the original application documents can be found. It seems to be not immediately apparent that the groove (22) around valve seat (23) is thinner, since in the drawing figures said groove (22) is shown to be larger than the width of valve seat (23).
- I.3 As foreseen by Rule 70.2(c) PCT, this international preliminary examination report is being established as if the above mentioned amendments to independent claims 1 and

compressor of the type known e.g. from document **JP 07-103138 (= D2)**.

In this manner the skilled person would directly arrive at the subject-matter of claim 1 without the performance of an inventive step (Article 33(3) PCT).

- V.2 It is noted that the subject-matter of claim 1 also lacks an inventive step (Article 33(3) PCT) over a combination of the teachings from document **D2** and document **JP 52-147302 (= D3)**.

Document **D3** discloses a valve arrangement having a suction valve, wherein a predetermined clearance between a flexible plate 9 and a valve seat 8 of a valve plate 5 is being formed with the help of clearance forming means 10. The applicant acknowledges on page 2 of the description that document **D3** contains a "thin plate" between the valve seat and the flexible suction valve plate.

- V.3 Dependent claim 10 does not appear to define any additional feature which, in combination with the features of any claim to which it refers, meets the requirements of the PCT with respect to inventive step, because the recessed area of the valve plate 30 around valve seat 30-1 shown in document **D1** is considered to represent a clearance forming means comprised of a groove.

5 had not been made. Hence, it is theoretically assumed for the rest of this report that the subject-matter of claims 1 and 5 are as defined in the original application documents.

**Re Item V**

**Reasoned statement**

V.1 The present international application does not meet the requirements of the PCT, because the subject-matter of independent claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

Document **EP 0 955 463 A (= D1)** discloses (e.g. in Fig. 3):

- a compressor having a cylinder block, a cylinder bore, a piston, as well as suction and discharge chambers as these are being defined in the introductory portion of claim 1;
- a valve forming a suction valve 30-2 and a discharge valve 30-3;
- a valve plate 30 having a suction hole 30-2 and a discharge hole 30-3;
- said suction valve being provided with a flexible plate 20;
- said suction valve being further provided with a suction valve structure in which the flexible plate has a main body 20 and an opposing part 20-1 integrally formed with said main body 20 and facing the suction hole 30-2;
- clearance forming means 60 which forms a predetermined clearance 30-1a between said opposing part 20-1 and a valve seat 30-1 of said valve plate 30 by isolating said opposing part from said valve seat by a predetermined distance;
- said clearance forming means 60 being formed e.g. on said valve plate 30.

In view of the above mentioned technical features which are known from the prior art **D1**, the subject-matter of claim 1 merely differs in that the compressor comprises a crank chamber within which a drive shaft is rotatably supported in an axial manner.

It is considered that a person skilled in the art of reciprocating compressors would readily foresee a valve arrangement as known from the compressor of document **D1** in a

## CLAIMS

1. (Amended) A compressor comprising:
  - 5 a cylinder block which has a cylinder bore to accommodate a piston;  
a crank chamber which is provided at one end of the cylinder block;  
a suction chamber and a discharge chamber that are provided at the other  
end of the cylinder block;  
a valve that is provided between the cylinder bore and the suction chamber  
10 and between the cylinder bore and the discharge chamber;  
a valve plate provided with the valve and having a suction hole to  
communicate between the cylinder bore and the suction chamber and a discharge  
hole to communicate between the cylinder bore and the discharge chamber;  
a suction valve provided with the valve and assemble to the side of the  
15 cylinder bore of the valve plate, and the suction valve is comprised of a flexible  
plate to be able to open and close the suction hole;  
a drive shaft that is rotatably and axially supported within the crank  
chamber to reciprocally actuate the piston; and  
a valve structure in which the suction valve is formed with a suction valve  
20 main body, and an opposing part that is integrally formed on the suction valve main  
body, and faces the suction hole and a valve seat at the opening edge of the suction  
hole so as to be able to open and close the suction hole, and clearance forming  
means, which forms a predetermined clearance between the opposing part and the  
valve seat by isolating the opposing part from the valve seat by a predetermined  
25 distance, is formed on at least one of the valve plate and the suction valve, wherein

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there is no gap in the valve structure except for the opposing part.

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2. The compressor according to claim 1, wherein  
the clearance forming means comprises a coating layer having a  
predetermined-thickness coated on at least one of the valve plate main body  
5 excluding the valve seat at the opening edge of the suction hole and the suction main  
body.

3. (Cancelled)

10

4. (Cancelled)

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5. (Amended) The compressor according to claim 1, wherein  
the clearance forming means comprises a concave portion provided by  
20 having a range where at the edge of the suction hole of the valve plate including the  
valve seat and is formed thinner than the other valve plate main body,  
and wherein a groove formed thinner than the valve seat is provided in  
periphery of the valve seat so that the groove surrounds the suction hole.

25 6. The compressor according to claim 1, wherein

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the clearance forming means comprises a concave portion provided by having a range where at the edge of the suction hole of the valve plate including the valve seat and is formed thinner than the other valve plate main body,

and wherein a groove is provided around the valve seat, and width of the  
5 groove of a one part is bigger than the width of other parts of the groove.

7. The compressor according to claim 5 or 6, wherein  
the upper surface of the valve seat is chamfered or rounded.

10 8. (Cancelled)

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9. (Added) The compressor according to claim 5, wherein an outer edge step of the groove is chamfered or rounded.
10. (Added) The compressor according to claim 1, wherein the clearance forming means is comprised of a groove formed in the suction valve.
- 5

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